

**WE CLAIM:**

1. Apparatus, comprising:
  - a hash value generator having outputs for an index value and a signature value,
  - a first memory array having an input coupled to the index value output,
  - a comparator, having inputs coupled to the signature value and an output from the first array, and
  - a second memory array having inputs coupled to the index value output and an output of the comparator.
2. The apparatus of claim 1, wherein the first memory array comprises a plurality of entries, each entry having fields to store signature values.
3. The apparatus of claim 1, wherein the second memory array comprises a plurality of entries, each entry having fields to store payload data responsive to an input data value to be input to the hash value generator.
4. The apparatus of claim 3, wherein entries of the second memory array further comprise a field to store a copy of input data to which the payload data relates.
5. The apparatus of claim 4, further comprising a comparator coupled to the input of the hash value generator and to the second memory array.
6. The apparatus of claim 1, wherein an output of the comparator includes a position indicator indicative of a field in an array entry that causes a match with a signature value.
7. The apparatus of claim 1, further comprising an input to the hash value generator
8. The apparatus of claim 1, wherein the hash value generator has inputs for IP source and destination addresses and TCP source and destination port designators.
9. The apparatus of claim 8, wherein the IP source and destination address have a bit length of 32.
10. The apparatus of claim 8, wherein the IP source and destination address have a bit length of 128.

11. The apparatus of claim 1, wherein the index value and signature values are selected from non-overlapping portions of a common hash value.
12. The apparatus of claim 1, wherein the first memory array is provided in SRAM and the second memory array is provided in DRAM.
13. The apparatus of claim 1, wherein the first and second memory arrays are commingled members of a common memory system.
14. Apparatus, comprising:
  - a hash value generator having outputs for at least two index values and a signature value,
  - for each index value output from the hash value generator:
    - a first memory array having an input coupled to the respective index value output,
    - a comparator, having inputs coupled to the signature value and an output from the first array, and
    - a second memory array having inputs coupled to respective the index value output and an output of the comparator.
15. The apparatus of claim 14, wherein entries of the first memory array comprise a plurality of fields to store signature values.
16. The apparatus of claim 14, further comprising a comparator having a pair of inputs coupled respectively to an output of the second memory array and to an input of the hash value generator.
17. The apparatus of claim 14, wherein entries of the second memory array are to store only payload data.
18. The apparatus of claim 14, wherein entries of the second memory array have fields to store payload data and input data to which the payload data corresponds.
19. The apparatus of claim 14, wherein the hash value generator has inputs for IP source and destination addresses and TCP source and destination port designators.

20. The apparatus of claim 19, wherein the IP source and destination address have a bit length of 32.
21. The apparatus of claim 19, wherein the IP source and destination address have a bit length of 128.
22. The apparatus of claim 14, wherein the index values and signature values each are selected from non-overlapping portions of a common hash value.
23. The apparatus of claim 14, wherein the first memory array is provided in SRAM and the second memory array is provided in DRAM.
24. The apparatus of claim 14, wherein the first and second memory arrays are commingled members of a common memory system.
25. A data retrieval method, comprising:  
responsive to input data, generating an index value and a signature value through a hash function,  
retrieving a first data unit using the index value,  
comparing signature values in the first data unit to the generated signature value,  
if a match occurs, retrieving a second data unit using the index value and a position of the signature value.
26. The data retrieval method of claim 25, further comprising comparing the input data to a portion of data in the second data unit and, if they match, outputting a second portion of the data unit.
27. The data retrieval method of claim 26, further comprising, if the input data and the data portion do not match, outputting an indication that the input data misses the memory.
28. The data retrieval method of claim 25, further comprising, if the generated signature does not match any signature in the first data unit, allocating a new entry to the input data and storing the generated signature in an unoccupied position of the first data unit.
29. The data retrieval method of claim 25, wherein the index value and signature value each are selected from non-overlapping portions of a common hash value.

30. The data retrieval method of claim 25, wherein the input data is IP source and destination addresses and TCP source and destination port designators.
31. The data retrieval method of claim 30, wherein the IP source and destination address have a bit length of 32.
32. The data retrieval method of claim 30, wherein the IP source and destination address have a bit length of 128.
33. A data retrieval method, comprising:  
responsive to input data, generating a plurality of index values and a signature value through a hash function,  
for each index value:  
retrieving a data unit from a respective first memory array using the index value,  
comparing signature values in the first data unit to the generated signature value,  
if a match occurs, retrieving a second data unit from a respective second memory array using the index value and a position of the signature value.
34. The data retrieval method of claim 33, further comprising comparing the input data to a portion of data in the second data unit and, if they match, outputting a second portion of the data unit.
35. The data retrieval method of claim 34, further comprising, if the input data does not match any of the second data units, outputting an indication that the input data misses the memory.
36. The data retrieval method of claim 33, further comprising, if the generated signature does not match any signature in the first data unit, allocating a new entry to the input data and storing the generated signature in an unoccupied position of the first data unit.
37. The data retrieval method of claim 33, wherein the index values and signature value each are selected from non-overlapping portions of a common hash value.
38. The data retrieval method of claim 33, wherein the input data is IP source and destination addresses and TCP source and destination port designators.

39. The data retrieval method of claim 38, wherein the IP source and destination address have a bit length of 32.

40. The data retrieval method of claim 38, wherein the IP source and destination address have a bit length of 128.